Birth control and the medical practitioner.

Publication/Creation

London : Bentley & Co., (Printers) Ltd. : Issued by House of Rendell, [between 1900 and 1999]

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AND THE
MEDICAL PRACTITIONER

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BIRTH CONTROL
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CHAPTER ONE.

Some General Observations.

This book surveys briefly, but critically and scientifically, modern contraceptive methods. It makes no attempt to influence any views on the ethics of the problem which the reader may hold. The subject of birth control has, in recent years, been openly discussed by the Church, by public men of all kinds, and by the general public. Whatever may be thought about the broader aspects of the question, there is little doubt that men and women now make up their own minds, and are no longer content to let accident rule the number of children they will have, or determine when those children shall arrive.

The attempt of woman to control her reproductive powers may be traced down the ages beyond written history. Every imaginable method has been tried, including those dependent upon magic, incantations, charms, and potions: some of the last-named, it may be concluded, have been in the nature of abortifacients. There is some historical evidence of operations, such as oviarectomy, or the making of an incision in the glans penis so that the seminal fluid should fall upon the ground. It is a vain wish, but we cannot but regret that no statistics are available to show the rate of mortality attendant upon such operations. At least they might be expected to show that the bearing of children would have been a preferable alternative.

Other methods have been variously based. Some women of primitive tribes have practised special movements at the conclusion of coitus whereby the seminal fluid has been expelled. A large group have been known to practise intercourse only at certain times, a procedure which has similarities with the so-called "safe period." It is clear, also, that many primitive communities have employed spermicides not greatly different from some of those employed to-day. Having said so much, it must be admitted that a careful analysis of past methods, conducted in the light of modern knowledge, yields the conviction that probably

some eighty per cent. could not have prevented pregnancy, and that where the desired result was achieved, it must often have been at the expense of grave illness. At least we have, in this respect, advanced greatly, and what we are witnessing to-day is a process whereby a practice—always sought after, whether it be considered desirable or not—is being guided into rational channels.

This guidance is often the duty of the medical practitioner. His position is, in some respects, an anomalous one. His aim is to save and prolong life and, in the ordinary course of his duties, to safeguard the arrival of a new generation. It has, however, been pointed out by an eminent medical man that the profession has helped to create the conditions which go to make up this world-wide problem of population. The doctor has fostered an increase in population through his successful contest with preventable disease and with infantile mortality, and by bringing up delicate people to the marriageable age.

But apart altogether from this aspect of the question, which may be considered by some to be merely academic, there are special circumstances in which the doctor cannot avoid recommending birth control. There are many conditions, of a more or less ephemeral nature, which dictate a postponement of the strain of

child-birth, and there are others which make the bearing of children entirely undesirable. We may quote from the report of the influential medical committee on the *Medical Aspects of Contraception,* published in 1927. Dealing with the reasons for the use of contraceptives, the report says: "As this is a medical report, only reasons based on medical grounds can be given here. The indications for the use of contraceptives include diseases of an hereditary character, such as some forms of insanity, and in addition syphilis, incurable diseases such as non-compensated heart disease, Bright's disease and tuberculosis; also conditions that make child-bearing dangerous, such as pelvic deformity, tumours, severe debliity and varicose veins, caused by frequent child-bearing. Poverty, deficient housing accommodation, etc., are not within the scope of a medical enquiry."

But it is of interest that the Committee, which took a great deal of evidence from experts of wide experience, was reluctant to exclude poverty altogether from its findings. In another part of the report it is stated: "We are of opinion that no impediment should be placed in the way of those married couples who desire information as to contraceptives, when this is needed for medical reasons or because of excessive child-bearing or poverty."

Before we pass from this report, it will be of interest to make a final quotation, of some significance. "With regard to the woman, evidence brought before us suggests that in cases in which, on medical grounds or on account of already large families, contraceptives are advisable, their use brings about an improvement in general health owing to freedom from anxiety as to the possibility of pregnancy, increased happiness in the home, better outlook and greater affection for the children. Some women, on the other hand, suffer from irritability of temper or more serious effects on the nervous system. It is said that these latter conditions are more common when coitus interruptus is practised." It will be shown, in the subsequent pages of this book, that the nervous disorders referred to seem to be very much dependent on the particular method of contraception which is used.

Apart from those cases where the initiative may rest with the doctor, it will often happen that his advice is specifically sought by young married couples. The reasons put forward may be economic or frankly selfish, and the medical man will not always feel easy in his mind about the desirability of imparting information. He may argue, with justice, that it is not within the province of the profession to give birth-control instruction if there are no sound medical

reasons for doing so. Against this it may be said that those who seek the advice of the doctor have probably already made up their minds. If information is refused it is unlikely that an attempt at contraception will not be practised. More probably the young couple will turn to prejudiced or incompetent sources for the knowledge they wish to obtain. They may be led to adopt undesirable methods or even, in despair, to resort to dangerous abortion, though the latter may be disguised under some pleasanter name. The health of each party may come to be seriously affected, and the doctor may find it difficult to avoid a feeling of responsibility, reproaching himself that it would have been wiser to have given the information when his advice was originally asked for.

Enough has been said to make it clear that birth control—no matter what the ethics of the question—is a problem which cannot fail to engage the close and earnest attention of the medical profession. The object of this book is to place before the doctor, in a succinct and easily referable form, the technical data about the various methods of contraception, including some account of the results of experimental work conducted in recent years. Many members of the profession, in their desire to guide the movement into rational channels, have formed research groups, in this and

other countries, to elucidate knowledge of all the mechanisms at work. The factors which make for the success or failure of any particular method have been, and are being, carefully studied. It is not until a method has been employed for a considerable time that any useful decision can be made as to its efficacy. A temporary success may mean nothing more than that coitus has taken place during a period of comparative infertility, or that the spermatozoa have possessed a low vitality. Experience of certain methods has, however, already extended over a sufficiently long period and, in addition, research work has demonstrated the dangers of some methods and the disadvantages of others, so that we are in a position to determine those which are likely to prove most efficient and pleasant to the users.

CHAPTER TWO.

Common Methods and Common Fallacies.

There are certain undesirable methods which, in spite of all that has been written and disclosed in recent years, are still widely practised. Their persistence, it must be said, is due in great part to a fallacious faith in their efficiency and to a profound ignorance of their dangers. It is possible, and is indeed not uncommon, that some of those who testify to the certainty of some particular method are sterile, and therefore any method, or none at all, would give equally emphatic results.

Coitus Interruptus.

This, from the time of Onan as recorded in Genesis, has had a long history and is undoubtedly, as the evidence of clinical cases reveals, one of the most widely practised methods among certain classes to-day.

No method, sooner or later, so surely fails. A normally healthy man requires to exert exceptional determination in his attempt to control his ejaculation. Even when he does, in fact, achieve success, the resultant strain is apt to have a debilitating effect. There must, however, come a time when the control will fail, and the method, for all its undoubted disadvantages to both parties, be rendered nugatory.

The effect of *coitus interruptus* on the woman is sometimes serious. The male gets a qualified gratification, but the withdrawal often prevents the woman from achieving her own orgasm, so that she suffers from aroused, but unfulfilled, sexual desire. This, as clinical cases painfully testify, is often a cause of acute depression. Complete union is never possible. Neurasthenia can often be diagnosed as having its origins in the practise of this method, and where the doctor is suspicious that this is in fact taking place, he will judge it necessary to advise the use of a reliable contraceptive.

It is, also, of further importance that microscopic examination has revealed that active spermatozoa may exist within the meatus, merely as a result of erection, and these may suffice, if the vaginal conditions are favourable, to bring about conception, irrespective of the control of the subsequent ejaculation.

There would be little to be said for this method, even if it were entirely reliable. But when to uncertainty there must be added well-authenticated psychological effects such as irritability of temper, or hysteria, or even a pathological state such as impotence, for all of which this method is at times responsible, it must be said that it should be whole-heartedly condemned. The doctor should not fail to lay emphasis on its dangers.

Before we pass from this method, a variation of it, *coitus reservatus*, may be noted. This is similar, except that the erect penis is kept in position until the female orgasm has taken place, but without the male ejaculation. The strain is thus shifted almost entirely to the male, and not only does his burden become heavier, but the chances of failure are, of course, increased. All that has been said in condemnation of *coitus interruptus* applies also to this variation of it, with the added objection that the chances of failure are many times greater.

The Safe Period.

This method still has its advocates, but it can hardly be recommended when the desire is to prevent conception and not merely to lessen its chances of taking place. The word " safe " is a misnomer and

may, in itself, lead some people to practise this method with misguided confidence. The medical man will do well to point out that " safe " is a strictly relative term, and all that it means is that there is a time during which the possibilities of conception are diminished.

It is, of course, generally true that ovulation occurs about the twelfth day after the onset of menstruation, and that as the life of the ovum is only three days, any spermatozoa liberated within the vagina after the ovum has already died, that is to say, after about the fourteenth day, have only a negligible chance of bringing about conception. To make it possible at all, the spermatozoa would have to exist a further twenty-five days awaiting the shedding of a new ovum. That this period between the death of the ovum and the beginning of the next menstruation is relatively safe must be agreed. But—and herein lies the unreliability of the method—so many variables exist that it is difficult or impossible for a woman to ascertain the exact date on which the ovum has died. The variables consist in differences in the time of ovulation, in the length of life, not only of the ovum but also of the spermatozoon, in the vitality of the latter cell, and in the chemical condition reigning in the vagina and uterus of the female.

There will be many times when this method will be found to answer, but it will do so possibly more by chance than by calculation. On account of the element of uncertainty, it is a fact that often great worry to both partners results. This anxiety will persist between the act of coitus and the next menstruation, and cannot fail to exert a harmful influence on the health of the parties. Another disadvantage, more or less important according to the temperaments of those who practise this method, is that it defines and restricts the times for coitus, irrespective of the feeling of either or both of the parties. It tends, therefore, to militate against, or to eliminate, the spontaneity of the act, a fact which is of some psychological importance. And it is relevant, in this connection, to point out that the so-called safe period is a time when the woman is likely to be, comparatively, sexually quiescent. Alternatively, if the woman is strongly-sexed, it may be said to be doubtful whether she will have anything more than a very short safe period or, possibly, any at all. To sum up, the safe period, as a method, cannot be indiscriminately recommended. In special cases, among them women who are sexually sub-normal and in whom it may be possible to define the period with tolerable accuracy, the method may be suitable. But the disadvantages which result from the

lack of spontaneity imposed must still not be lost sight of.

Prolonged Lactation.

It is an old belief that while a woman is lactating she cannot become pregnant. Like other old beliefs, it has a substratum of truth and finds a measure of support from recent knowledge upon the mechanism of the numerous hormones which control sex. In practice, however, failure often occurs. It has been advanced that this may be due to the abnormalities of modern life. Many mothers of the present day are unable, or unwilling, to breast-feed their babies, and it may be readily understood that a change in the normal endocrine secretions may be brought about when any link in the chain is broken, and this change will have its repercussion upon others. Now ovulation and lactation are theoretically antagonistic states, and if the latter is inhibited, the former may once again re-commence.

At the worst, this method is unreliable and, at the best, even if the desired result is achieved, it will, and often does, encourage abnormal lactation periods which may be seriously detrimental to the health both of the mother and the child. The most the doctor can say, if his advice on this particular method is sought, is that

some women are less likely to conceive while they are nursing, but he should point out, emphatically, if another pregnancy is temporarily undesirable, that lactation is no guarantee against conception, and should advise a reliable contraceptive.

Abstinence.

This is the one method about the certainty of which there can be no dispute or reservations. If it can be practised, without harmful results, there is nothing more to be said. But it is seldom possible for a young and normal married couple to avoid sexual excitement, and if this is not gratified, psychological ills, or sexual irregularities, may result. Those who argue that intercourse is unnecessary may instance some unmarried individual who has obviously not suffered in health, but there are many aspects which tend to modify such a statement, or, at least, to affect its wider application. It is not always difficult to forego an experience of which one has no knowledge, and the unmarried individual cannot be compared, in a matter of this kind, with one who is married. Furthermore, the emotional reactions of the married partners must be carefully considered. What may be a definite hardship for one, may seem to be trivial to the other and, among this group, are found a large

percentage of married incompatibles. Emotional outlet, of course, may be obtained in many ways other than sexual intercourse. But for normal married people, who lead a normal sexual life, abstinence may be said to be impracticable or, if practised, will result in one of the partners seeking relief elsewhere, or in the various forms of unhappiness with which the doctor and social worker come so often in contact.

CHAPTER THREE.

Some Facts of Generation.

Before considering the action of mechanical contraceptives and of spermicidal chemicals, it may be well to emphasize a few facts which have bearing on their possible effectiveness. It is, first of all, an important point in this connection that once the spermatozoa have passed through the cervical canal and gained entry into the uterus, they cannot be acted upon by chemical contraceptives. It must not be forgotten, also, that the size of the *os uteri* varies greatly, and is usually very large and often lacerated in multiparous women.

The normal acidity of the vagina, maintained by Daederlein's Bacillus, is often, in various ways, interfered with and, in consequence, other organisms may be introduced and gain a foothold with the result that

the acidity becomes definitely less marked. On the other hand, the acidity in gouty women is so accentuated that the spermatozoa may be immobilized, a condition which can be rectified by douching with sodium bicarbonate.

The secretion of alkaline mucus, poured out by the woman after (and possibly during) intercourse, one effect of which is to neutralize the normal acidity of the vagina and so create conditions temporarily favourable for the activity of the spermatozoa, are of some importance, because one class of chemical contraceptives is entirely dependent on moisture for efficacy. Opinion remains divided about the nature and volume of these secretions. Baker suggests that 2.5cc. is a normal value, but he gives no supporting evidence. Nor is he explicit whether this amount is present in the vagina before intercourse has begun, or whether it is entirely produced as a result of friction during coitus. The importance of this point will appear in a subsequent chapter when the use of the foam tablet is discussed.

The spermatozoa within the epididymis are quiescant as a result of the effects of expired carbon dioxide, which not only tends to increase the acidity of the medium of suspension, but also acts as an anæsthetic. Before ejaculation, the seminal fluid is admixed with

the prostatic secretion which neutralizes the acidity and thus tends to re-vitalize the spermatozoa, and since the seminal fluid contains a relatively large percentage of calcium, we find another mechanism for the preservation of these cells as the carbon dioxide will probably react with it to form insoluble calcium carbonate, thus removing the carbon dioxide from the medium.

The seminal fluid, the medium of suspension for the spermatozoa, is highly proteinous. As in other colloidal systems, the proteins exert a buffering action against changes in acidity or alkalinity, a property which must be kept in mind when consideration is being given to contraceptives which depend for their effect upon acid alone.

The ejaculate consists of some four to five cubic centimetres of seminal fluid, prostatic, and other small glandular secretions, although, in fact, this volume varies greatly. On the average, there are 226 million spermatozoa in a normal ejaculate of the male, but, according to Lode, this may vary from zero to 551 million. Lode has also calculated that between the ages of 25 and 55, a man produces over 339 thousand million of these cells. It is estimated that the spermatozoa move at the rate of 3.5 m.m. per minute, and from this fact it is obvious that, unless a barrier is interposed, they will, within a very short time of the

ejaculation, have found their way from the vagina into the cervical canal. The formation of such a barrier, as will be shown, is a fundamental basis of chemical contraceptives. If the barrier is unformed, defective, or breaks down, the spermatozoa, if left alive within the vagina, will gain entry through the cervical canal, in which site they cannot be acted upon by spermicidal chemicals. These must, therefore, be introduced in such a manner that they perform their part of killing the spermatozoa before this entry becomes possible.

CHAPTER FOUR.

Mechanical Contraceptives.

The Condom.

A chemical contraceptive for use by the male has not yet been produced and is, indeed, so unlikely as to require no further reference. At the present time the male can only adopt mechanical methods of which his choice is strictly limited. The most common appliance is the condom, or sheath, which has been in use for some hundreds of years, and was apparently adopted originally as a protection against venereal disease. There are many varieties manufactured today, made either of thin rubber or skin. The skin condoms, however, are not commonly met with. They require careful handling, are apt to perforate easily, and suffer the added disadvantage that they have to be soaked in water before being adjusted. The thin rubber sheath is the kind usually used, but although

it is preferable because it interferes less with the fulness of the union, it is more liable, particularly if the rubber has deteriorated, to break at the critical moment. The objections to the use of the condom are many and may be simply stated. It is, of all methods of birth control, the most unæsthetic. It not uncommonly brings about a failure of coitus because of pain due to irritation of the mucous membrane by the rubber. In some women the condition of the vagina is naturally dry, and the act of coitus produces little or no secretion. In such instances, the use of a sheath by the male can hardly fail to prove unpleasant and may, possibly, produce acute soreness. The sheath prevents contact between the glans penis and the vaginal tissues, and thus robs the act of ciotus of its proper benefits. Both parties suffer. The husband can never obtain full satisfaction and the wife is deprived of the sensation during the ejaculation, and, in addition, of the possible benefits due to contact with the seminal secretions.

Apart from these physical and physiological objections, the condom is very much subject to risk of accident. Rubber deteriorates with age, and sheaths which have been bought, as they so often are, without knowledge of their origin or date, bring the risk that they may easily tear in use.

In the early stages of married life men and women are not unprepared to adopt this method, but there comes a time when the sheath is offensive, and the doctor would be ill-advised to recommend its use, knowing as he does, that it can never give permanent satisfaction. In exceptional cases it may be recommended as an additional precaution. Where it is absolutely imperative that the woman should not bear any more children, it may, indeed should, be added to the method practised by her. It will make the risk almost negligible and, above all, it will make the woman easy in her mind and so tend to eliminate probable anxiety neuroses arising from doubts of success.

What has been said applies to all kinds of condoms, but an additional note may be added about the variety intended for repeated use. These are made of thicker rubber and therefore begin with the drawback that the sensitivity is lessened. And their continued efficiency is dependent on the human factor. If the instructions issued with the washable condoms are strictly followed, they will last for a considerable time. These instructions are that after use the condoms must be washed, dried, sprinkled with french chalk, and put away. A simple procedure, but one which is open to errors of omission and of judgment. It may be said,

without much fear of contradiction, that the condom will, in fact, be left lying about overnight and make cleansing more difficult, and certainly be a cause for the deterioration of the rubber. The water used for washing may be too hot. Nor is the drying process, inside and out, too easy if it is to be properly done. When these processes have been completed, the washable condom must be placed, unrolled and flat, in a place of equable temperature until next required, when it must first be rolled.

In conclusion, however, it must be said, so that the matter be presented in its proper perspective, that the condom, when bought from a firm of repute and used with intelligence, is a fairly reliable method. There can, however, be no sort of absolute guarantee against accidents, and the æsthetic and other drawbacks of the method remain.

The Occlusive Pessary.

Of the mechanical appliances used by the female, the oldest and best known is the cap pessary. Numerous types are to be found, but they all depend on one principle—the placing of a barrier across the opening of the cervical canal so that the spermatozoa cannot enter. They are made of sheet rubber or celluloid. One of the first to advocate the rubber pessary was

Mensinga, and an appliance which bears his name is still in use to-day. It is difficult to set out the advantages of one type over another, as so much depends upon the anatomical configuration of the users. Many women experience difficulty in fitting them and, in the first instance, the pessary must be fitted by one who possesses special training and knowledge in these matters. The pessary may be displaced by movement, and it is therefore to be recommended that a chemical contraceptive be used at the same time.

The use of the cap pessary cannot be effective in the presence of contracted cervix or where it is badly lacerated or prolapsical.

A common type of cap pessary in use is the one with a spring rim. If this is closely examined—and this applies even more to some other makes of occlusive pessary—the conviction cannot be avoided that spermatozoa may pass between the rubber rim and the vaginal wall and thus secure an entry. Many of those who advocate the cap pessary recommend that the rim be smeared with a jelly or ointment to ensure a closer fit. This jelly or ointment is not necessarily spermicidal and, in any case, is not present in sufficient amount to be so, and hence the spermatozoa which have been liberated within the vagina may still be alive (according to the degree of acidity of this organ in

particular cases), and if and when the pessary is removed next morning may gain an entry. Therefore it is often further recommended that a spermicide be used. Finally it is stressed that douching should be carried out so that any spermatozoa which may still be present shall be washed away. Incidentally, it may be remarked that douching is not easily effected under certain modern housing conditions. The occlusive pessary, therefore, though it is often a successful method, acts in many instances by virtue of a series of comprehensive precautions. There are those, however, who testify to the general efficiency of one or other of the cap pessaries, and proper weight must be given to their evidence.

Some of the objections already noted as applicable to the condom apply also to the occlusive pessary. Although it is made of rubber of greater thickness and will, therefore, withstand careless treatment for a longer time, yet the continued use of certain jellies, preparations of a greasy nature such as vaseline, or acids, will lead to the deterioration of the rubber and render the pessary useless for its purpose. This is a state of affairs often encountered in the clinics where experience shows that the instructions are not seldom ignored, or else are followed carelessly and fitfully. If the pessary is retained in the vagina for long periods,

illnesses may be caused. Certainly the careless or dirty woman should be warned against the use of this appliance. It is a fact, also, demonstrated by clinical reports, that a number of women are nauseated by the use of a cap pessary, while the male partner often raises objections for various reasons.

Miscellaneous Methods.

A multitude of miscellaneous methods have been evolved and practised from time to time, many of them variations of those already considered, and subject, therefore, to similar arguments and criticisms. Of such are the intra-cervical pessaries, or the Gräfenberg ring, both of which require to be fitted by a medical man, but the concensus of opinion indicates that these are definitely harmful in the majority of cases. Various chemical rubber occlusive pessaries have been introduced, but seem to be distinctly less advantageous than the ordinary methods. Reference is also in place here to hormonic sterilization and to forms of surgical procedure whereby a permanent sterility may be achieved. Further information on these methods, which are of academic interest or else only of exceptional application, should be sought in the most recent literature on the subject. In this group will come such operations as bilateral vasec-

tomy in the man, a simple operation which is infallible so far as sterilization is concerned, but has no deleterious effect on the desire or ability to achieve coitus. The sectioning of the Fallopian tubes in the female, although it necessitates a rather longer period of recuperation, cannot to-day be considered a serious operation, and, once again, has no effect on the normal progress of the sexual act. But these methods, which may be judged to be necessary when, for sufficient reasons, absolute and permanent sterilization are required, have no general interest.

CHAPTER FIVE.

Chemical Contraceptives.

From what has been written it is clear that some method is demanded which possesses a greater degree of security without some, or all, of the disadvantages of the practices so far considered. And it is within the chemical group, as might be expected, that we must look for satisfaction of this demand.

The instant death of the spermatozoa can, of course, be brought about by chemical means, but this is of value only if the chemicals, which must be otherwise harmless, can be correctly applied and in such a manner that they will spread and react, even in the presence of the proteins, and regardless of the condition within the vagina. This last point, as will be seen, is of considerable importance.

Laboratory experiments in the chemical group have been widespread, but have mainly been confined to the spermicidal effects of the chemicals. The more important question of prevention of the entry of the spermatozoa has received less attention. Once these cells have been localized within the vagina their death can be easily achieved.

Kolliker was one of the first to make experiments with spermicides, but the contemporary knowledge of chemistry was such that few of Kolliker's results can be considered of value to-day.

In 1907, Günther made a comprehensive study of sperm poisons, and his research has proved of great value to the modern student in this field. Günther's experiments, somewhat elaborate, were made with the sperm of animals, and with acids, salts, and " antiseptic " compounds, and the research student will find his published results of considerable interest.† Quite recently Baker, at the instigation of the Birth Control Investigation Committee, has considered the spermicidal power of pure chemicals as well as of some of the proprietary contraceptives. This worker

† *See* Günther, *Uber Spermgifte,* Arch. f. Ges. Phys., July, 1907. *Also,* Dr. Ludwig Fraenkel's, *Die Empfängnis Verhütung* (1932), an authoritative and careful study of modern contraceptive methods which includes a detailed international bibliography of the subject.

has evolved a standard technique for the examination of the vitality of spermatozoa which others may be recommended to follow.

Voge has made an elaborate research for the National Committee on Maternal Health, New York, and it is a matter for congratulation that his study, probably the most comprehensive of its kind, has now been made generally available.* Voge approached the problem from a somewhat different angle from that of other workers. He early became convinced that the spermicidal power of a chemical was not primarily of the greatest importance, but that the first and chief necessity was the capacity of the chemical contraceptive to prevent the spermatozoa from gaining entry to the *os uteri*.

The perfect spermicide must satisfy certain conditions. It must be non-toxic, non-irritating to the user, simple to apply, and lethal to the spermatozoon. Water, for instance, satisfies all the conditions except the essential one of simplicity of application. The question is, how a substance, possessing the characteristics of water, shall be conveyed into the vagina, remain there before and during coitus, and, finally,

* *Chemistry and Physics of Contraceptives*, by Cecil I. B. Voge, B.Sc., Ph.D., F.R.S.E. (Cape, 1933). Another modern and comprehensive book should also be mentioned here, namely, *Control of Conception*, by Dickinson and Bryant (1932).

act upon the ejaculated spermatozoa and bring about their death.

The chemicals used may be grouped as follows :—

(i) *Weak Spermicides.*—Quinine, Chinosal; Acids, —Boric, Tartaric, Lactic; and carbon dioxide.

(ii) *Large Concentrations of these Weak Spermicides.*

(iii) *Strong Spermicides.*—Salts of Aluminium, Salts of Zinc, Formates.

Although the weak spermicides may be classed as slow in their action, according to the degree of concentration, this is no disadvantage if the vehicle in which the spermicide is compounded is of such a nature that the spermatozoa are caught and held, so that they can be acted upon over a relatively long period.

In practice it is a fact that the action of acids is disappointing. It is apposite to recall that three degrees of acidity exist. Where the chemical contraceptive is pronouncedly acid, the spermatozoa will be immediately immobilized. When the value is a little less than this, the spermatozoa may be acted upon, but re-activation may take place. A higher value than either of the foregoing, approaching neu-

trality, will result in little detriment to the spermatozoa.

The spermatazoon being a typical, though a highly specialized, cell, follows the various laws which govern the behaviour of cells in liquids. The thin membrane surrounding the cell is permeable to chemicals of a certain molecular aggregation. Crystaloids, such as salts, are capable of this ionization, and can pass freely from one side of the membrane to the other. Acids which ionize—and the strength of the acid is a function of the ionization—act in a similar manner. There normally exists within the cell a certain concentration of sodium chloride and certain other ions, and if the spermatozoon be placed in a solution where the concentration of these ions is greater than that existing within the cell, then ionic movement takes place in the direction from the region of highest concentration to the lowest. This continues until an equilibrium has been reached. If the cell, on the other hand, is placed within a solution which is hypotonic in comparison with the tonicity existing within the cell, a similar adjustment takes place, but with the ionic flow in the other direction. The result of this ionic adjustment appears, in almost all cases where the flow has been great enough, to result in the death of the cell.

The spermatozoon, however, is not an isolated cell. As it normally exists in a concentration of several millions per c.c., there is a tendency to resist adverse conditions and to exert a protective action. In addition, the seminal proteins exert a further protective action upon the spermatozoa against the precipitating action of ions, and against other effects which might result in the immobilization of the cells.

The above arguments have reference chiefly to the use of salts and acids and should be borne in mind when a spermicide has to rely entirely upon these for its effect.

Gums and cocoa butter are largely used in contraception. Although they may bring about the death of the spermatozoa by entangling, they are not primarily spermicides, but are used as vehicles for spermidical compounds. It is upon substances of this class that success in chemical contraception depends.

It has already been remarked, but may be repeated, that the perfect spermicide must be non-toxic, simple to apply, non-irritating to the user, and, finally, lethal to the spermatozoa. The vehicles which are chosen to bear the spermicidal chemicals are four in number, namely, cocoa butter, gelatin, gums, and substances capable of producing foams. Spermicides are intimately compounded in these mixtures, and as

they are solid, or semi-solid, at ordinary temperature, they can easily be inserted in the vagina. When within this organ, the spreading of the spermicide will result from the fact that the cocoa butter, or gelatin, is liquid at body heat.

The Cocoa Butter Suppository.

The very great advantages of cocoa butter as a vehicle are recognised. Its one possible drawback—its slight odour—can, if necessary, be entirely overcome, but complete deodorization will affect the glutinous, and, therefore, the entangling, qualities of the suppository. It can, however, be overcome to the point when it is no longer appreciably noticeable, and certainly not obnoxious, by strict care in the choice of material and by scrupulous treatment during the process of manufacture. Research work has also shown that care in the selection of the raw material, as well as in the manufacture, makes all the difference to the spermicidal efficacy of the suppository. That is to say, it is essential for the medical man to discriminate between articles which appear to be similar, but which are, in fact, through a difference in the quality of the cocoa butter, and through fundamental differences in the treatment of the raw materials, really very different products.

The Rendell Pessary.

Nor is this discrimination difficult. The firm of W. J. Rendell, Ltd., manufacturers of the cocoa butter quinine suppository, occupy a unique position. Their product has been in use for over half a century and has acquired a world-wide reputation. The original method of preparation has never failed to prove entirely satisfactory and has not, therefore, called for any modification. The only improvements which have been made have been in the equipment of the Rendell laboratories, in which advantage has continuously been taken of modern scientific inventions. The machinery installed is of the most up-to-date kind. Only the highest quality of cocoa butter is used and this is subjected to special processes whereby all fibrous and foreign matter is removed, and the cocoa butter is brought to a consistency which ensures that it will always melt at the same temperature, that is to say, just below body heat.

The quinine salts, before they are compounded with the vehicle, undergo exhaustive tests for purity and solubility, and the blending is so intimately carried out that a correct proportion of these soluble quinine salts throughout every particle of cocoa butter is assured. This quality of perfect distribution, of such paramount importance, can be infallibly tested and

demonstrated by a scientific apparatus installed in the Rendell laboratories. Each Rendell pessary is of standard size, weight and constitution. Also, as has been proved by independent experiment, it has a marked acidity, in which quality it differs from every other make except those which depend on acid alone. The Rendell pessary, therefore, has a treble defence mechanism, namely, the formation of an adequate barrier which prevents the spermatozoa from finding their way into the cervical canal, and the spermicidal qualities of the quinine and of the acid.

The part played by the efficiency of the barrier in all chemical contraceptive methods, and the importance of choice of material as an element of this efficiency, have been made clear. In this connection it is apposite to state that samples of the Rendell pessary, fifteen years old, were examined by one independent research worker who found that, except for a slight bleaching effect, the pessaries had undergone no change. Another piece of practical evidence, which is by way of being a tribute to the quality of Rendells, is in the fact that although Martindale and Westcott have stated that an addition of yellow wax should be made to the cocoa butter suppository for export to a hot climate, the Rendell pessary requires no such special treatment, as has been indubitably proven by

research and experience. It may, however, be noted here that if, through carelessness on the part of the user, deterioration should occur, then the suppository is unusable. This constitutes a natural safeguard. Other products, although they might have deteriorated to the point of complete inefficiency, may still be employed with the user ignorant of the fact of their deterioration, and consequently lulled into a false sense of security.

The Rendell pessaries are solid and therefore easy to insert, and, as the cocoa butter will always cause them to melt just below body heat, which is constant, they are entirely independent of any physical idiosyncracies of the user. This is of importance when this method is compared, for instance, with the conditions which have to be satisfied before the foam tablet can be successful.

The repute in which Rendell's pessaries are held has led to many imitations being made and offered for sale. Some of these are definitely harmful. The crude quality of cocoa butter of which they are made cannot be relied upon to melt at body heat, and contains, furthermore, fibrous matter which may set up acute irritation. Inferior quinine is also sometimes employed in the manufacture and has been found to be badly blended with the vehicle. Pessaries of this nature

which have been examined have been shown to contain four times the amount of quinine necessary, but, in spite of this excess, the pessaries have been proved ineffective because the quinine has not been soluble and has been inefficiently distributed throughout the cocoa butter.

It is, then, of considerable importance that a strong warning should be given against some of the imitations of the Rendell product. In dealing with a firm of long standing and experience, and of high repute, and one which has command of all the resources essential for the manufacture of a first-class article, the public may be assured. This assurance is all the more necessary because the use of defective preparations, inefficient for their advertised purpose, and, also, sometimes damaging in their effects, have, on occasion, antagonised those who have tried them, and have led to false conclusions about the value of the quinine pessary.

It may be that these products also have led to a belief, occasionally expressed in quarters which must be noticed, that the quinine pessary has the defect that it may produce quinism, or be a cause of sterility. It is doubtful whether even the defective products merit this opprobrium, but it is certainly untrue of the Rendell pessary.

On these points there is, happily, independent testimony. In the *Lancet* of January, 1899, there appeared some notes, over the signature of W. Wright Hardwicke, M.D., M.R.C.P., L.R.C.S., of considerable interest. Extracts from them are worthy of quotation, not only for their bearing on what has been said above, but also for their more general interest. Discussing the use of quinine in leucorrhœa, he said: "Quinine, topically applied to the mucous surfaces of the cervex uteri and vagina, was suggested by the good effects accidentally manifested by this drug when used in the form of pessaries, though for quite a different purpose. A patient, the mother of six children, who had been a sufferer from the above complaint for some years, having used the various remedies usually prescribed in such cases, but with only temporary benefit, her trouble sooner or later recurring, adopted the use, from prudential motives, of what I found to be quinine pessaries. I learned from her that since using them not only had her leucorrhœa disappeared, but her general health had improved also. Though she had been in the habit of using from two to four of these pessaries a week for a period of over two years, she had never suffered any ill-effects such as quinism. I have since used quinine topically in several cases of simple leucorrhœa,

and in every case with great success—in fact, I do not know of a single instance in which it has failed or in which quinism has been produced. It may be used in the form of douche or pessary. I adopt the latter form as being obviously the better one, the drug having a better chance of closer and more continuous contact with the congested membrane. . . . It is a matter of astonishment that quinine in the form of pessary has never been used before in the treatment of leucorrhœa and ulceration, for its valuable properties—tonic, astringent, and antipyretic—suggest it as a useful remedy in such cases, but I can find no record of such in any of the well-known works on the subject."

In his address delivered before the Medico-Chirurgical Society in January, 1927 (reprinted in the *Lancet,* No. 5395), Giles, referring to the quinine pessary, which he described as the chief chemical method of contraception, called it, also, " one of the most dependable methods . . . free from the objectionable features common to some other plans."

Adverting to the question of quinism, although those who have had wide general experience of the quinine pessary have not found any such drawback associated with its use, it is a fact that, in extremely rare instances, the systems of certain individuals, men

or women, reject quinine, or, at least, that their reactions to quinine are entirely abnormal. It may be that women of this very rare class still find the quinine inimical, even when introduced in the form of a pessary. But few women so constituted exist, although it is well to note the fact of their existence, because, otherwise, one isolated case of the kind might lead to false conclusions which would, indeed, be as logical as a condemnation of the egg as an article of general diet because it has a deleterious effect on certain individuals.

To sum up, it may be said that the Rendell Pessary goes a long way to satisfy the conditions of the ideal spermicide. It is extremely simple to apply, it is non-toxic (with the rare exception noted above, and then the only result is discomfort), it is non-irritating to the user (on the contrary it acts, because of the cocoa-butter vehicle, as a lubricant), and it is lethal to the spermatozoa. It has the additional quality, not unimportant, that if deterioration should occur, then it is unusable, so that so-called accidents become impossible. Finally, its qualities are reinforced by the recommendations of fifty years of use and experience.

The Gelatin Suppository.

There are a number of gelatin suppositories on the

market. The spermicides are compounded into gelatin at such a temperature that the gelatin is liquid, and when the compound cools, in moulds, solid pessaries are produced. The gelatin suppository may be divided into two sub-groups. In the first we find a low concentration of gelatin which will melt easily, but which is liable to deteriorate and is difficult to insert. In the second, deterioration will not occur and insertion is easy, but the melting is not so satisfactory.

Hence, apart from other considerations, the gelatin suppository cannot be said to be so efficacious as the cocoa-butter type.

The Jellies.

The gums, gum acacia, gum tragacanth, etc., take up water and become viscous semi-solids according to their concentration. These can be compounded with a spermicide, and the jelly so produced can be filled into a collapsible metal tube and expressed, as and when desired, through a nozzle. Unless, however, extreme care is taken in the process of manufacture, the jelly is apt to separate into its constituent parts. This compound requires that the anterior and posterior fornices of the vagina be filled with the jelly, and also that the mouth of the *os uteri* be so adequately covered that no entry of the spermatozoa can take place. It

may be claimed for the jellies that their use is fairly simple, but there is a certain amount of procedure. When the cap of the tube is removed, the nozzle has to be screwed into position and, after insertion, has to be washed, a rubber cap being placed over the end of the nozzle. The washing, etc., part of this procedure may tend to be left over until the following morning, and to that extent makes the method unhygienic. Some newer preparations are of the one-application type which are to be thrown away after use. Chiefly, however, the user will not often be able to free her mind from the element of doubt, worried by the fear that the amount of jelly expressed into the vagina was, after all, perhaps insufficient to prevent pregnancy. It is a fact, also, that a number of women are extremely nervous about inserting any sort of instrument into the vagina. On the whole, it seems safe to assert that the jelly group can never become as popular as the cocoa-butter suppository in comparison with which it suffers drawbacks without any compensating advantages.

The Foam Tablet.

The foam tablet has this in common with the cocoa-butter suppository, that it can be inserted simply and left to do its work without further interfer-

ence. The essential ingredients for the production of a foam are sodium bicarbonate and an acid, tartaric usually being employed. The tablets are solid, but in contact with moisture they begin to interact with a consequent liberation of carbon dioxide. This liberation of gas produces a foam which, in the presence of a colloid, results in a stable barrier. The ultimate effect may be likened to the old-time sponge method. One make of foam tablet relies on the proteins of the vaginal secretions for the colloid which will produce and maintain the stable foam.

To the basic mixture of the foam tablet other spermicides are added and, in theory, these are disseminated throughout the vagina during the interaction, and the evolution of the gas should ensure an adequate penetration into all the essential crevices.

In practice, however, it is often found that no, or else, little, interaction occurs. Voge has made exhaustive examinations of the foaming reactions of various proprietary articles, and also of different foaming mixtures, under the variation of conditions and alteration in the volume of moisture. His results may be considered illuminating. Many of the tablets, in the test tubes, scarcely reacted at all in the presence of very small amounts of water, 0.5 c.c. It must, however, be remarked that water, of course, is not the fluid

present within the vagina. Not much seems to have been done in the way of estimating the volume of the vaginal secretions, but from clinical evidence it would seem that 0.5 c.c. is a value that is approximately correct. It should be borne in mind that it is essential that this secretion be present before coitus has begun so that it may interact with the tablet and cause the foam to be liberated. That is to say, it is a necessary feature of this method that the foam should prepare the way, before the ejaculation, if the spermatozoa are to be immobolized. In some instances, where coitus is normally and properly performed, sufficient moisture may be secreted to ensure this preliminary reaction. It is, however, within medical knowledge that a large number of persons play a comparatively passive rôle in the sexual act, apart from the ejaculation on the part of the male, and, in these instances, the conditions which must be satisfied if the foam tablet is to do its work are hardly likely to be fulfilled. Thus there is an element of vital doubt since the users have not, indeed they can hardly have, the knowledge to foretell whether the method is likely to be successful or not.

Although the foam tablet is, in theory, an excellent device, its apparent advantages are entirely negatived if the primary interaction with moisture does not take place. And this interaction cannot be guaranteed.

Indeed, as a very large number of women appear to possess a very small volume of vaginal secretion, the foam tablet, interesting as it is as an experiment, may be ruled out as a general practical method. Incidentally, it is apposite to remark that, in such cases, the effect of the cocoa-butter suppository is to supply the lubricant which the vagina lacks for the smooth accomplishment of the union.

Foam Jellies.

The disadvantages incidental to the foam tablet have prompted Voge to elaborate a method which aims at a combination of the good points of the foam tablet and the jelly. The constituents are compounded separately and are divided into two tubes so arranged that pressure causes two streams to emerge from a common orifice into a nozzle. The nozzle is placed within the vagina and, when the tube is pressed, the two streams meet, the constituents interact, and a spermicidal foam is formed which will fill the fornices and *os uteri*. This method, although it is an improvement (a) on the jelly and (b) on the foam tablet, obviates none of the procedure already noted. That is to say it is, comparatively, clumsy and, no matter how certain it may be in its action, is hardly likely to have an assured future.

Douching.

Between douching and other chemical methods there is this fundamental difference, that chemical contraceptives are applied before coitus, whereas in douching the chemical is applied afterwards. It would, therefore, always appear possible that the spermatozoa have already passed beyond the range of the douche before it is applied. Furthermore, douching is associated with a certain amount of trouble for the woman at an unwelcome and, in the winter, possibly dangerous, time.

There is an appreciable informed opinion that douching is a harmful habit, a view which, at first consideration, is at variance with the known daily hygienic ritual of the French. But more careful thought would, perhaps, suggest that these views are not, in fact, inconsistent. If the organisms within the vagina, which keep at bay the undesirable group of the cocci, are removed by douching, then the cocci will get an opportunity to gain a foothold. The only way to prevent this contingency is by consistent douching. In other words, if this argument is soundly based, douching can only be considered harmful when it is carried out spasmodically.

Conclusions.

From this brief account of the chief methods of contraception practised to-day, it is possible to draw certain conclusions. Information that is at once authentic and adequate, relative to all the various methods is, by the very nature of the investigation, hard to come by, but certain broad facts seem obvious enough. Those methods which are not dependent on chemical or mechanical appliances, but on what may be termed the " will-power " of the user, that is such as *coitus interruptus,* have little that is good to be said for them, being either harmful or unreliable, or both together. Abstinence, which may be classed in this group, is really a case by itself and calls for no further comment here. The mechanical methods, such as the condom or occlusive pessary, have been shown to be unæsthetic—a sufficiently serious deterrent to married couples of certain temperaments—and, also, at some time or another, unreliable. The occlusive pessary has also the disadvantage that, when used by certain types of careless women, it may set up illnesses. As permanent methods of general application, none of the mechanical appliances can be recommended. It is to the chemical group, as might be expected, that we must turn for the contraceptive which best approaches the ideal. And of the various articles in this group,

it seems clear that the cocoa-butter quinine suppository, when reliably compounded, is outstanding. It is simple to apply, it creates an efficient barrier additional to its spermicidal action, it is non-toxic and non-irritating, and, because of the tonic and astringent qualities of the quinine is often, in fact, definitely beneficial. This being so it cannot be out of place to repeat that the Rendell Pessary is pre-eminent. It can be recommended with entire confidence as a standard product, tested by many generations of married people, and manufactured in laboratories equipped with the most up-to-date machinery and every modern advantage. These pessaries have enjoyed, over a long period of years, the confidence of the medical profession, a privilege of which Messrs. Rendell are justly appreciative, and one which, for their part, they will spare neither effort nor expense to continue to deserve.

Printed and published by
BENTLEY & CO. (PRINTERS) LTD.,
161-165, ROSEBERY AVENUE, LONDON, E.C.1.